Draft

Air Quality Study

Success Dam Seismic Remediation Project

Prepared for:

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1.1 INTRODUCTION

This report describes the methods and results of an analysis conducted to determine the air quality effects associated with implementing the Success Dam Seismic Remediation Project (project).

1.2 PROJECT DESCRIPTION

Success Dam is located on the northwest side of State Route (SR) 190, approximately 5 miles east of the city of Porterville, in Tulare County, California. The purpose of the project is to modify Success Dam so that it is able to withstand shaking from earthquakes that are expected to occur during the lifetime of the dam. The existing dam does not meet tolerable life safety risk guidelines. The alternatives being considered for dam remediation are the New Earthen Embankment Dam Alternative (the preferred alternative) and the Jet Grout Alternative, as well as the No Project Alternative. Construction of a new earthen dam or reinforcement of the existing dam through the jet grouting process would require substantial quantities of borrow materials that would be obtained from project lands around Lake Success and other lands nearby.

1.3 AFFECTED ENVIRONMENT

1.3.1 INTRODUCTION

This section describes the regulatory setting for the analysis of air quality effects, as well as existing air quality conditions in the vicinity of the proposed project.

1.3.2 REGULATORY SETTING

Air quality within Tulare County is regulated by the U.S. Environmental Protection Agency (EPA), California Air Resources Board (ARB), and the San Joaquin Valley Air Pollution Control District (SJVAPCD). Each of these agencies develops rules, regulations, policies, and/or goals to comply with applicable legislation. Although EPA regulations may not be superseded, both state and local regulations may be more stringent.

Air quality regulations focus on the following air pollutants: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), respirable and fine particulate matter (PM_{10} and $PM_{2.5}$), and lead. Because these are the most prevalent air pollutants known to be deleterious to human health and extensive health-effects criteria documents are available, they are commonly referred to as "criteria air pollutants."

FEDERAL

At the federal level, the EPA has been charged with implementing national air quality programs. The EPA's air quality mandates are drawn primarily from the federal Clean Air Act (CAA), which was enacted in 1970. The most recent major amendments made by Congress were in 1990.

The CAA required the EPA to establish national ambient air quality standards (NAAQS). As shown in Table 1, the EPA has established primary and secondary NAAQS for the following criteria air pollutants: ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. The primary standards protect the public health and the secondary standards protect public welfare. The CAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The federal Clean Air Act Amendments of 1990 (CAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. The EPA has responsibility to review all state SIPs to determine conformation to the mandates of the CAA, and the amendments thereof, and determine if implementation will achieve air quality goals. If the EPA determines a SIP to be inadequate, a Federal

Implementation Plan (FIP) may be prepared for the nonattainment area that imposes additional control measures. Failure to submit an approvable SIP or to implement the plan within the mandated timeframe may result in sanctions being applied to transportation funding and stationary air pollution sources pollution sources in the air basin.

In addition, general conformity requirements were adopted by Congress as part of the CAAA and were implemented by EPA regulations in 1993. General conformity requires that all federal actions conform to the SIP as approved or promulgated by EPA. The purpose of the general conformity program is to ensure that actions taken by the federal government do not undermine state or local efforts to achieve and maintain NAAQS. Before a federal action is taken, it must be evaluated for conformity with the SIP. All reasonably foreseeable emissions predicted to result from the action are taken into consideration. These include direct and indirect emissions, and must be identified as to location and quantity. If it is found that the action would create emissions above de minimis threshold levels specified in EPA regulations, or if the activity is considered regionally significant because its emissions exceed 10% of an area's total emissions, the action cannot proceed unless mitigation measures are specified that would bring the project into conformance.

STATE

The ARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA, which was adopted in 1988, required the ARB to establish California ambient air quality standards (CAAQS) (Table 1). The ARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the above mentioned criteria air pollutants. In most cases the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard setting process and the interpretation of the studies. In addition, the CAAQS incorporate a margin of safety to protect sensitive individuals.

The CCAA requires that all local air districts in the state endeavor to achieve and maintain the CAAQS by the earliest practical date. The act specifies that local air districts should focus particular attention on reducing the emissions from transportation and area-wide emission sources, and provides districts with the authority to regulate indirect sources.

Other ARB responsibilities include, but are not limited to, overseeing local air district compliance with California and federal laws, approving local air quality plans, submitting SIPs to the EPA, monitoring air quality, determining and updating area designations and maps, and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels.

LOCAL

The SJVAPCD seeks to improve air quality conditions in Tulare County through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of the SJVAPCD includes the preparation of plans and programs for the attainment of ambient air quality standards, adoption and enforcement of rules and regulations, and issuance of permits for stationary sources. The SJVAPCD also inspects stationary sources, responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements other programs and regulations required by the CAA, CAAA, and the CCAA.

In January 2002, the SJVAPCD released a revision to the previously adopted guidelines document. This revised Guide for Assessing and Mitigation Air Quality Impact (GAMAI) (SJVAPCD 2002) is an advisory document that provides lead agencies, consultants, and project applicants with uniform procedures for addressing air quality in environmental documents. The guide contains the following applicable components:

- Criteria and thresholds for determining whether a project may have a significant adverse air quality impact;

Table 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California		National [1]		
		Standards [2,3]	Attainment Status [4]	Primary [3,5]	Secondary [3,6]	Attainment Status [7]
Ozone	1-hour	0.09 ppm ($180\ \mu g/m^3$)	N (Severe)	-[9]	-	-
	8-hour	0.07 ppm[8] ($137\ \mu g/m^3$)	–	0.08 ppm ($157\ \mu g/m^3$)	Same as Primary Standard	N (Serious)
Carbon Monoxide (CO)	1-hour	20 ppm ($23\ mg/m^3$)	A	35 ppm ($40\ mg/m^3$)	–	U/A
	8-hour	9 ppm ($10\ mg/m^3$)		9 ppm ($10\ mg/m^3$)		
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	–	–	0.053 ppm ($100\ \mu g/m^3$)	Same as Primary Standard	U/A
	1-hour	0.25 ppm ($470\ \mu g/m^3$)	A	–		–
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	–	–	0.030 ppm ($80\ \mu g/m^3$)	–	U/A
	24-hour	0.04 ppm ($105\ \mu g/m^3$)	A	0.14 ppm ($365\ \mu g/m^3$)	–	
	3-hour	–	–	–	0.5 ppm ($1300\ \mu g/m^3$)	
	1-hour	0.25 ppm ($655\ \mu g/m^3$)	A	–	–	–
Respirable Particulate Matter (PM_{10})	Annual Arithmetic Mean	$20\ \mu g/m^3$	N	-[11]	Same as Primary Standard	N(Serious)
	24-hour	$50\ \mu g/m^3$		$150\ \mu g/m^3$		
Fine Particulate Matter ($PM_{2.5}$)	Annual Arithmetic Mean	$12\ \mu g/m^3$	N	$15\ \mu g/m^3$	Same as Primary Standard	N
	24-hour	–	–	$65\ \mu g/m^3$		
Lead[10]	30-day Average	$1.5\ \mu g/m^3$	A	–	–	–
	Calendar Quarter	–	–	$1.5\ \mu g/m^3$	Same as Primary Standard	U/A
Sulfates	24-hour	$25\ \mu g/m^3$	A	**No National Standards**		
Hydrogen Sulfide	1-hour	0.03 ppm ($42\ \mu g/m^3$)	U			
Vinyl Chloride[10]	24-hour	0.01 ppm ($26\ \mu g/m^3$)	U/A			

Table 1
Ambient Air Quality Standards

Pollutant	Averaging Time	California		National [1]		
		Standards [2,3]	Attainment Status [4]	Primary [3,5]	Secondary [3,6]	Attainment Status [7]
Visibility-Reducing Particle Matter	8-hour	Extinction coefficient of 0.23 per kilometer —visibility of 10 miles or more (0.07—30 miles or more for Lake Tahoe) because of particles when the relative humidity is less than 70%.	U			

[1] National standards (other than ozone, PM, and those based on annual averages or annual arithmetic means) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration in a year, averaged over 3 years, is equal to or less than the standard. The PM_{10} 24-hour standard is attained when 99% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. The $PM_{2.5}$ 24-hour standard is attained when 98% of the daily concentrations, averaged over 3 years, are equal to or less than the standard. Contact the EPA for further clarification and current federal policies.

[2] California standards for ozone, CO (except Lake Tahoe), SO2 (1- and 24-hour), NO_2, PM, and visibility-reducing particles are values that are not to be exceeded. All others are not to be equaled or exceeded. CAAQS are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

[3] Concentration expressed first in units in which it was promulgated [i.e., parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$)]. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[4] Unclassified (U): a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment.

Attainment (A): a pollutant is designated attainment if the state standard for that pollutant was not violated at any site in the area during a 3-year period.

Nonattainment (N): a pollutant is designated nonattainment if there was a least one violation of a state standard for that pollutant in the area.

Nonattainment/Transitional (NT): is a subcategory of the nonattainment designation. An area is designated nonattainment/transitional to signify that the area is close to attaining the standard for that pollutant.

[5] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public health.

[6] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[7] Nonattainment (N): any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.

Attainment (A): any area that meets the national primary or secondary ambient air quality standard for the pollutant.

Unclassifiable (U): any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard for the pollutant.

[8] This concentration effective May 17, 2006.

[9] The 1-hour ozone NAAQS was revoked on June 15, 2005.

[10] ARB has identified lead and vinyl chloride as toxic air contaminants with no threshold of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

[11] Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the EPA revoked the annual PM_{10} standard on September 21, 2006.

Source: ARB 2006a, EPA 2006a.

- Specific procedures and modeling protocols for quantifying and analyzing air quality impacts;
- Methods available to mitigate air quality impacts;
- Information for use in air quality assessments that will be updated more frequently such as air quality data, regulatory setting, climate, and topography.

The SJVAPCD prepares and submits Air Quality Attainment Plans (AQAPs) in compliance with the requirements set forth in the CCAA. The CCAA also requires a triennial assessment of the extent of air quality improvements and emission reductions achieved through the use of control measures. As part of the assessment, the attainment plans must be reviewed and, if necessary, revised to correct for deficiencies in progress and to incorporate new data or projections. As a nonattainment area, the region is also required to submit rate-of-progress milestone evaluations in accordance with the CAAA. These milestone reports include compliance demonstrations that the requirements have been met for the nonattainment area. The air quality attainment plans and reports present comprehensive strategies to reduce reactive organic gas (ROG), NO_X, and PM_{10} emissions from stationary, area, mobile, and indirect sources. Such strategies include the adoption of rules and regulations; enhancement of CEQA participation; implementation of a new and modified indirect source review program; adoption of local air quality plans; and stationary-, mobile-, and indirect-source control measures. Table 2 summaries SJVAPCD's most current AQAPs.

Table 2
Summary of San Joaquin Valley Air Pollution Control District Air Quality Plans

Pollutant	Plan Title	Date	Status
Ozone	Extreme Ozone Attainment Demonstration Plan, San Joaquin Valley Air Basin Plan Demonstrating Attainment of Federal 1-hour Ozone Standards	October 2004, Amended October 2005.	Adopted by SJVAPCD and ARB in October 2004. Submitted to EPA in November 2004[1].
	Draft Staff Report, 8-hour Ozone Reasonably Available Control Technology – State Implementation Plan (RACT SIP) Analysis	April 2006	Public comment through May 2006. Due to EPA in September 2006.
	8-hour Ozone Attainment Demonstration Plan for the San Joaquin Valley	-	In progress. Due to EPA by June 2007.
Carbon Monoxide (CO)	2004 Revision to the California State Implementation Plan for Carbon Monoxide Updated Maintenance Plan for the Federal Planning Areas	July 2004	Adopted by ARB July 2004.
Respirable and Fine Particulate Matter (PM_{10} and $PM_{2.5}$)	2006 PM_{10} Plan. San Joaquin Valley Strategy for Meeting Federal Air Quality Requirements for Particulate Matter 10 Microns and Smaller	February 2006	Adopted by SJVAPCD February 2006. Submitted to EPA.
	$PM_{2.5}$ Plan	-	In progress. Due to EPA April 2008.
	Natural Events Action Plan for High Wind Events in the San Joaquin Valley	February 2006	Adopted by SJVAPCD February 2006. Submitted to ARB

[1] Effective June 15, 2005, the EPA revoked in full the national 1-hour ozone ambient air quality standard, including associated designations and classifications.

Source: SJVAPCD 2005, 2006a, 2006b, 2006c

As mentioned above, the SJVAPCD adopts rules and regulations. All projects are subject to SJVAPCD rules and regulations in effect at the time of construction. Specific rules applicable to the construction of the proposed project may include, but are not limited to:

- Rule 2201 New and Modified Stationary Source Review
- Rule 2280 Portable Equipment Registration
- Rule 3135 Dust control Plan Fee
- Rule 4002 National Emission Standards for Hazardous Air Pollutants
- Rule 4101 Visible Emissions
- Rule 4102 Nuisance
- Rule 4103 Open Burning
- Rule 4601 Architectural Coatings
- Rule 4641 Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations
- Rule 4901 Wood Burning Fireplaces and Wood Burning Heaters
- Regulation VIII Fugitive PM_{10} Prohibitions include the following rules:
  - Rule 8021: Construction, demolition, excavation, and extraction; and other earthmoving activities;
  - Rule 8031: Handling and storage of bulk materials;
  - Rule 8041: Trackout / Carryout of dirt and other materials onto paved public roads;
  - Rule 8051: Open Areas;
  - Rule 8061: Construction and use of paved and unpaved roads; and
  - Rule 8071: Use of unpaved vehicle and/or equipment traffic areas; and
  - Rule 8081: Agricultural Sources.

- Rule 9110 General Conformity
- Rule 9510 Indirect Source Review Toxic Air Contaminants

TOXIC AIR CONTAMINANT

Air quality regulations also focus on TACs, or in federal parlance hazardous air pollutants (HAPs). In general, for those TACs that may cause cancer, there is no concentration that does not present some risk. In other words, there is no threshold level below which adverse health impacts may not be expected to occur. This contrasts with the criteria air pollutants for which acceptable levels of exposure can be determined and for which the ambient standards have been established (Table 1). Instead, the EPA and ARB regulate HAPs and TACs, respectively, through statutes and regulations that generally require the use of MACT and BACT to limit emissions. These in conjunction with additional rules set forth by the SJVAPCD establish the regulatory framework for TACs.

Federal Hazardous Air Pollutant Programs

The EPA has programs for identifying and regulating HAPs. Title III of the CAAA directed the EPA to promulgate national emissions standards for HAPs (NESHAP). The NESHAP may differ for major sources than for area sources of HAPs. Major sources are defined as stationary sources with potential to emit more than 10 tons per year (TPY) of any HAP or more than 25 TPY of any combination of HAPs; all other sources are considered area sources. The emissions standards are to be promulgated in two phases. In the first phase (1992–2000), the EPA developed technology-based emission standards designed to produce the maximum emission reduction achievable. These standards are generally referred to as requiring MACT. For area sources, the standards may be different, based on generally available control technology. In the second phase (2001–2008), the EPA is required to promulgate health risk–based emissions standards where deemed necessary to address risks remaining after implementation of the technology-based NESHAP standards.

The CAAA also required the EPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions, at a minimum to benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene. In addition, Section 219 required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.

State and Local Toxic Air Contaminant Programs

TACs in California are primarily regulated through the Tanner Air Toxics Act (AB 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588). AB 1807 sets forth a formal procedure for ARB to designate substances as TACs. This includes research, public participation, and scientific peer review before ARB can designate a substance as a TAC. To date, ARB has identified over 21 TACs, and adopted the EPA's list of HAPs as TACs. Most recently, diesel PM was added to the ARB list of TACs.

Once a TAC is identified, the ARB then adopts an Airborne Toxics Control Measure (ATCM) for sources that emit that particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate BACT to minimize emissions.

The Hot Spots Act requires that existing facilities that emit toxic substances above a specified level prepare a toxic-emission inventory, prepare a risk assessment if emissions are significant, notify the public of significant risk levels, and prepare and implement risk reduction measures.

The ARB has adopted diesel exhaust control measures and more stringent emission standards for various on-road mobile sources of emissions, including transit buses, and off-road diesel equipment (e.g., tractors, generators). In February 2000, the ARB adopted a new public transit bus fleet rule and emission standards for new urban buses. These new rules and standards provide for 1) more stringent emission standards for some new urban bus engines beginning with 2002 model year engines; 2) zero-emission bus demonstration and purchase requirements applicable to transit agencies; and 3) reporting requirements with which transit agencies must demonstrate compliance with the urban transit bus fleet rule. Upcoming milestones include the low sulfur diesel fuel requirement, and tighter emission standards for heavy-duty diesel trucks (2007) and off-road diesel equipment (2011) nationwide. Over time, the replacement of older vehicles will result in a vehicle fleet that produces substantially less TACs than under current conditions. Mobile-source emissions of TACs (e.g., benzene, 1-3-butadiene, diesel PM) have been reduced significantly over the last decade, and will be reduced further in California through a progression of regulatory measures [e.g., Low Emission Vehicle (LEV)/Clean Fuels and Phase II reformulated gasoline regulations) and control technologies. With implementation of ARB's Risk Reduction Plan, it is expected that diesel PM concentrations will be reduced by 75% in 2010 and 85% in 2020 from the estimated year 2000 level. Adopted regulations are also expected to continue to reduce formaldehyde emissions from cars and light-duty trucks. As emissions are reduced, it is expected that risks associated with exposure to the emissions will also be reduced.

The ARB recently published the *Air Quality and Land Use Handbook: A Community Health Perspective*, which provides guidance concerning land use compatibility with TAC sources (ARB 2005). While not a law or adopted policy, the handbook offers advisory recommendations for the siting of sensitive receptors near uses associated with TACs such as freeways and high-traffic roads, commercial distribution centers, rail yards, ports, refineries dry cleaners, gasoline stations, and industrial facilities to help keep children and other sensitive populations out of harm's way. A number of comments on the handbook were provided to the ARB by air districts, other agencies, real estate representatives, and others. The comments included concern over whether the ARB was playing a role in local land use planning, the validity of relying on static air quality conditions over the next several decades in light of technological improvements, and support for providing information that can be used in local decision making.

At the local level, air pollution control or management districts may adopt and enforce ARB control measures. Under SJVAPCD regulations II and VII, all sources that possess the potential to emit TACs are required to obtain permits from the district. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations, including new source review standards and air toxics control measures. The SJVAPCD limits emissions and public exposure to TACs through a number of programs. The SJVAPCD prioritizes TAC-emitting stationary sources based on the quantity and toxicity of the TAC emissions and the proximity of the facilities to sensitive receptors.

Sources that require a permit are analyzed by the SJVAPCD (e.g., health risk assessment) based on their potential to emit toxics. If it is determined that the project would emit toxics in excess of SJVAPCD's threshold of significance for TACs, as identified below, sources have to implement the best available control technology for TACs (T-BACT) to reduce emissions. If a source cannot reduce the risk below the threshold of significance even after T-BACT has been implemented, the SJVAPCD will deny the permit required by the source. This helps to prevent new problems and reduces emissions from existing older sources by requiring them to apply new technology when retrofitting with respect to TACs. It is important to note that SJVAPCD's air quality permitting process applies to stationary sources; and properties, which are exposed to elevated levels of non-stationary type sources of TACs, and the non-stationary type sources themselves (e.g., on-road vehicles) are not subject to air quality permits. Further, due to feasibility and practicality reasons, mobile sources (cars, trucks, etc.) are not required to implement T-BACT, even if they do have the potential to expose adjacent properties to elevated levels of TACs. Rather, emissions controls on such sources (e.g., vehicles) are subject to regulations implemented on the state and federal level.

ODORS

The SJVAPCD has determined some common types of facilities that have been known to produce odors, including wastewater treatment facilities, chemical manufacturing plants, painting/coating operations, feed lots/dairies, composting facilities, landfills, and transfer stations. Because offensive odors rarely cause any physical harm and no requirements for their control are included in state or federal air quality regulations, the SJVAPCD has no rules or standards related to odor emissions other than its nuisance rule. Any actions related to odors are based on citizen complaints to local governments and the SJVAPCD. According to the SJVAPCD, significant odor problems occur when there is more than one confirmed complaint per year averaged over a 3-year period or when there are three unconfirmed complaints per year averaged over a 3-year period (SJVAPCD 2002).

Two situations increase the potential for odor problems. The first occurs when a new odor source is located near existing sensitive receptors. The second occurs when new sensitive receptors are developed near existing sources of odor. In the first situation, the SJVAPCD recommends operational changes, add-on controls, process changes, or buffer zones where feasible to address odor complaints. In the second situation, the potential conflict is considered significant if the project site is at least as close as any other site that has already experienced significant odor problems related to the odor source. For projects locating near a source of odors where there is no nearby development that may have filed complaints, and for odor sources locating near existing sensitive receptors, the SJVAPCD requires the determination of potential conflict to be based on the distance and frequency at which odor complaints from the public have occurred in the vicinity of a similar facility (SJVAPCD 2002).

The SJVAPCD's Rule 4102 (Nuisance) addresses odor exposure in the SJVAB. Rule 4102 states that no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons, or to the public, or which endanger the comfort, repose, health, or safety of any such persons, or that public, or which cause to have a natural tendency to cause injury or damage to business or property.

1.3.3 ENVIRONMENTAL SETTING

The project site is located in Tulare County, which is within the San Joaquin Valley Air Basin (SJVAB). The SJVAB also comprises all of Fresno, Kings, Madera, Merced, San Joaquin, and Stanislaus, and the valley portion of Kern. The ambient concentrations of air pollutant emissions are determined by the amount of emissions released by pollutant sources and the atmosphere's ability to transport and dilute such emissions. Natural factors which affect transport and dilution include terrain, wind, atmospheric stability, and the presence of sunlight. Therefore, existing air quality conditions in the area are determined by such natural factors as topography, meteorology, and climate, in addition to the amount of emissions released by existing air pollutant sources, as discussed separately below.

Topography, Meteorology, and Climate

The SJVAB, which occupies the southern half of the Central Valley, is approximately 250 miles long and, on average, 35 miles wide. The SJVAB is a well-defined climatic region, with distinct topographic features on three sides. The Coast Ranges, which have an average elevation of 3,000 feet, are located on the western border of the SJVAB. The San Emigdio Mountains, which are part of the Coast Ranges, and the Tehachapi Mountains, which are part of the Sierra Nevada, are both located on the south side of the SJVAB. The Sierra Nevada forms the eastern border of the SJVAB. The northernmost portion of the SJVAB is San Joaquin County. There is no topographic feature delineating the northern edge of the basin. The SJVAB is basically flat with a downward gradient in terrain to the northwest. Air flows into the SJVAB through the Carquinez Strait, the only breach in the western mountain barrier, and moves across the Sacramento–San Joaquin River Delta from the San Francisco Bay area. The mountains surrounding the SJVAB create a barrier to airflow, which leads to the entrapment of air pollutants when meteorological conditions are unfavorable for transport and dilution.

The inland Mediterranean climate type of the SJVAB is characterized by hot, dry summers and cool, rainy winters. The climate is a result of the topography and the strength and location of a semi-permanent, subtropical high-pressure cell. During summer, the Pacific high-pressure cell is centered over the northeastern Pacific Ocean, resulting in stable meteorological conditions and a steady northwesterly wind flow. Upwelling of cold ocean water from below to the surface as a result of the northwesterly flow produces a band of cold water off the California coast. Daily summer high temperatures often exceed 100º F, averaging in the low 90s in the north and high 90s in the south. In the entire SJVAB, daily summer high temperatures average 95º F. Over the last 30 years, temperatures in the SJVAB averaged 90º F or higher for 106 days a year, and 100º F or higher for 40 days a year. The daily summer temperature variation can be as high as 30º F (SJVAPCD 2002). In winter, the Pacific high-pressure cell weakens and shifts southward, resulting in wind flow offshore, the absence of upwelling, and the occurrence of storms. Average high temperatures in the winter are in the 50s, but lows in the 30s and 40s can occur on days with persistent fog and low cloudiness. The average daily low winter temperature is 45º F (SJVAPCD 2002).

A majority of the precipitation in the SJVAB occurs as rainfall during winter storms. The rare occurrence of precipitation during the summer is in the form of convective rain showers. The amount of precipitation in the SJVAB decreases from north to south primarily due to the Pacific storm track that often passes through the northern part while the southern part remains protected by the Pacific high-pressure cell. Stockton in the north receives about 20 inches of precipitation per year, Fresno in the center receives about 10 inches per year, and Bakersfield at the southern end of the valley receives less than 6 inches per year. Average annual rainfall for the entire SJVAB is approximately 9.25 inches on the valley floor (SJVAPCD 2002).

The winds and unstable atmospheric conditions associated with the passage of winter storms result in periods of low air pollution and excellent visibility. Precipitation and fog tend to reduce or limit some pollutant concentrations. For instance, clouds and fog block sunlight, which is required to fuel photochemical reactions that form ozone. Because CO is partially water-soluble, precipitation and fog also tend to reduce concentrations in the atmosphere. In addition, respirable PM_{10} can be washed from the atmosphere through wet deposition processes (e.g., rain). However, between winter storms, high pressure and light winds lead to the creation of low-level temperature inversions and stable atmospheric conditions resulting in the concentration of air pollutants (e.g., CO and PM_{10}).

Summer is considered the ozone season in the SJVAB. This season is characterized by poor air movement in the mornings and longer daylight hours which provides a plentiful amount of sunlight to fuel photochemical reactions between ROGs and NO_X, which result in ozone formation. During the summer, wind speed and direction data indicate that summer wind usually originates at the north end of the San Joaquin Valley and flows in a south-southeasterly direction through the San Joaquin Valley, through Tehachapi pass, and into the Southeast Desert Air Basin (SJVAPCD 2002).

Existing Air Quality Conditions

Concentrations of the following criteria air pollutants: ozone, CO, NO_2, SO_2, PM_{10} and $PM_{2.5}$, and lead are used as indicators of ambient air quality conditions. A brief description of each criteria air pollutant including source types, health effects, and future trends is provided below along with the most current attainment area designations and monitoring data for the project area.

Ozone

Ozone is a photochemical oxidant, a substance whose oxygen combines chemically with another substance in the presence of sunlight, and the primary component of smog. Ozone is not directly emitted into the air, but is formed through complex chemical reactions between precursor emissions of ROG and NO_X in the presence of sunlight. ROG are volatile organic compounds that are photochemically reactive. ROG emissions result primarily from incomplete combustion and the evaporation of chemical solvents and fuels. NO_X are a group of gaseous compounds of nitrogen and oxygen that results from the combustion of fuels.

Ozone located in the upper atmosphere (stratosphere) acts in a beneficial manner by shielding the earth from harmful ultraviolet radiation that is emitted by the sun. However, ozone located in the lower atmosphere (troposphere) is a major health and environmental concern. Meteorology and terrain play a major role in ozone formation. Generally, low wind speeds or stagnant air coupled with warm temperatures and clear skies provide the optimum conditions for formation. As a result, summer is generally the peak ozone season. Because of the reaction time involved, peak ozone concentrations often occur far downwind of the precursor emissions. Therefore, ozone is a regional pollutant that often affects large areas. In general, ozone concentrations over or near urban and rural areas reflect an interplay of emissions of ozone precursors, transport, meteorology, and atmospheric chemistry (Godish 1991).

The adverse health effects associated with exposure to ozone pertain primarily to the respiratory system. Scientific evidence indicates that ambient levels of ozone affect not only sensitive receptors, such as asthmatics and children, but healthy adults as well. Exposure to ambient levels of ozone ranging from 0.10 to 0.40 parts per million (ppm) for 1 to 2 hours has been found to significantly alter lung functions by increasing respiratory rates and pulmonary resistance, decreasing tidal volumes, and impairing respiratory mechanics. Ambient levels of ozone above 0.12 ppm are linked to symptomatic responses that include such symptoms as throat dryness, chest tightness, headache, and nausea. In addition to the above adverse health effects, evidence also exists relating ozone exposure to an increase in the permeability of respiratory epithelia; such increased permeability leads to an increase in responsiveness of the respiratory system to challenges, and the interference or inhibition of the immune system's ability to defend against infection (Godish 1991).

Emissions of ozone precursors ROG and NO_X have decreased over the past several years because of more stringent motor vehicle standards and cleaner burning fuels. The ozone problem in the San Joaquin Valley ranks among the most severe in the State. Peak levels have not declined as much as the number of days that standards are exceeded. From 1985 to 2004, the maximum peak 8-hour indicator decreased only two percent. The number of national 8-hour standard exceedance days has been quite variable over the years. This variability is due, in part, to the influence of meteorology as well as changes to the monitoring network. The monitoring network was not as extensive during the 1980's as it has been during the last 14 years. For this reason, the period of 1990 to 2005 provides a better indication of trends. During this period, there has been an eight percent decrease in the three-year average of the number of exceedance days of the national 8-hour standard (ARB 2006b).

Carbon Monoxide

Carbon monoxide (CO) is a colorless, odorless, and poisonous gas produced by incomplete burning of carbon in fuels, primarily from mobile (transportation) sources. In fact, 77% of the nationwide CO emissions are from mobile sources. The other 23% consists of CO emissions from wood-burning stoves, incinerators, and industrial sources.

CO enters the bloodstream through the lungs by combining with hemoglobin, which normally supplies oxygen to the cells. However, CO combines with hemoglobin much more readily than oxygen does, resulting in a drastic reduction in the amount of oxygen available to the cells. Adverse health effects associated with exposure to CO concentrations include such symptoms as dizziness, headaches, and fatigue. CO exposure is especially harmful to individuals who suffer from cardiovascular and respiratory diseases (EPA 2006b).

The highest concentrations are generally associated with cold stagnant weather conditions that occur during the winter. In contrast to ozone, which tends to be a regional pollutant, CO problems tend to be localized.

Nitrogen Dioxide

Nitrogen dioxide (NO_2) is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2 (EPA 2006b). The combined emissions of NO and NO_2 are referred to as NO_X, which are reported as equivalent NO_2. Because NO_2 is formed and depleted by reactions associated with photochemical smog (ozone), the NO_2 concentration in a particular geographical area may not be representative of the local NO_X emission sources.

Inhalation is the most common route of exposure to NO_2. Because NO_2 has relatively low solubility in water, the principal site of toxicity is in the lower respiratory tract. The severity of the adverse health effects depends primarily on the concentration inhaled rather than the duration of exposure. An individual may experience a variety of acute symptoms, including coughing, difficulty with breathing, vomiting, headache, and eye irritation during or shortly after exposure. After a period of approximately 4 to 12 hours, an exposed individual may experience chemical pneumonitis or pulmonary edema with breathing abnormalities, cough, cyanosis, chest pain, and rapid heartbeat. Severe, symptomatic NO_2 intoxication after acute exposure has been linked on occasion with prolonged respiratory impairment with such symptoms as chronic bronchitis and decreased lung functions.

Sulfur Dioxide

Sulfur dioxide (SO_2) is produced by such stationary sources as coal and oil combustion, steel mills, refineries, pulp and paper mills. The major adverse health effects associated with SO_2 exposure pertain to the upper respiratory tract. SO_2 is a respiratory irritant with constriction of the bronchioles occurring with inhalation of SO_2 at 5 ppm or more. On contact with the moist mucous membranes, SO_2 produces sulfurous acid, which is a direct irritant. Concentration rather than duration of the exposure is an important determinant of respiratory effects. Exposure to high SO_2 concentrations may result in edema of the lungs or glottis and respiratory paralysis.

Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction operations, fires and natural windblown dust, and particulate matter formed in the atmosphere by condensation and/or transformation of SO_2 and ROG (EPA 2006b). Fine particulate matter ($PM_{2.5}$) includes a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less (ARB 2006b).

The adverse health effects associated with PM_{10} depend on the specific composition of the particulate matter. For example, health effects may be associated with metals, polycyclic aromatic hydrocarbons (PAH), and other toxic substances adsorbed onto fine particulate matter, which is referred to as the piggybacking effect, or with fine dust particles of silica or asbestos. Generally, adverse health effects associated with PM_{10} may result from both short-term and long-term exposure to elevated concentrations and may include breathing and respiratory symptoms, aggravation of existing respiratory and cardiovascular diseases, alterations to the immune system, carcinogenesis, and premature death (EPA 2006b). $PM_{2.5}$ poses an increased health risk because the particles can deposit deep in the lungs and may contain substances that are particularly harmful to human health.

Direct emissions of PM_{10} have remained relatively unchanged between 1975 and 2005 and are projected to remain unchanged through 2020. PM_{10} emissions in the SJVAB are dominated by emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, waste burning, and residential fuel combustion. Direct emissions of $PM_{2.5}$ decreased from 1975 to 2005 and are projected to continue decreasing through 2020. $PM_{2.5}$ emissions in the SJVAB are dominated by emissions from area-wide sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, waste burning, and residential fuel combustion (ARB 2006b).

Lead

Lead is a metal found naturally in the environment as well as in manufactured products. The major sources of lead emissions have historically been mobile and industrial sources. As a result of the phase-out of leaded gasoline, as discussed in detail below, metal processing is currently the primary source of lead emissions. The highest levels of lead in air are generally found near lead smelters. Other stationary sources are waste incinerators, utilities, and lead-acid battery manufacturers.

Twenty years ago, mobile sources were the main contributor to ambient lead concentrations in the air. In the early 1970s, the EPA set national regulations to gradually reduce the lead content in gasoline. In 1975, unleaded gasoline was introduced for motor vehicles equipped with catalytic converters. The EPA banned the use of leaded gasoline in highway vehicles in December 1995 (EPA 2006b).

As a result of the EPA's regulatory efforts to remove lead from gasoline, emissions of lead from the transportation sector have declined dramatically (95% between 1980 and 1999), and levels of lead in the air decreased by 94% between 1980 and 1999. Transportation sources, primarily airplanes, now contribute only 13% of lead emissions. A National Health and Nutrition Examination Survey reported a 78% decrease in the levels of lead in people's blood between 1976 and 1991. This dramatic decline can be attributed to the move from leaded to unleaded (EPA 2006b).

The decrease in lead emissions and ambient lead concentrations over the past 25 years is California's most dramatic success story. The rapid decrease in lead concentrations can be attributed primarily to phasing out the lead in gasoline. This phase-out began during the 1970s, and subsequent ARB regulations have virtually eliminated all lead from gasoline now sold in California. All areas of the state are currently designated as attainment for the state lead standard (the EPA does not designate areas for the national lead standard). Although the ambient lead standards are no longer violated, lead emissions from stationary sources still pose "hot spot" problems in some areas. As a result, the ARB identified lead as a toxic air contaminant.

Monitoring Station Data and Attainment Area Designations

Criteria air pollutant concentrations are measured at several monitoring stations in the SJVAB. The Visalia-North Church Street station is the closest in proximity to the project site with recent data for ozone, NO_2, CO, PM_{10}, and $PM_{2.5}$. In general, the ambient air quality measurements from this station are representative of the air quality in the project area. Table 3 summarizes the air quality data from the most recent 3 years.

Table 3
Summary of Annual Ambient Air Quality Data (2003–2005)

	2003	2004	2005
Ozone			
Maximum concentration (1-hr/8-hr, ppm)	0.124/0.102	0.133/0.099	0.117/0.099
Number of days state standard exceeded (1-hr)	43	17	27

Table 3 Summary of Annual Ambient Air Quality Data (2003–2005)			
	2003	2004	2005
Number of days national standard exceeded (1-hr/8-hr)	0/31	1/12	0/13
Nitrogen Dioxide (NO_2)			
Maximum concentration (1-hr, ppm)	0.087	0.078	0.069
Number of days state standard exceeded (1-hr)	0	0	0
Annual Average (ppm)	0.018	0.016	0.016
Carbon Monoxide (CO)			
Maximum concentration (8-hr, ppm)	3.03	2.24	2.61
Number of days state/national standard exceeded (8-hr)	0/0	0/0	0/0
Respirable Particulate Matter (PM_{10})			
Maximum concentration (μg/m^3)	100.0	82.0	124.0
Number of days state standard exceeded (calculated[1])	17	15	24
Number of days national standard exceeded (calculated[1])	0	0	0
Fine Particulate Matter ($PM_{2.5}$)			
Maximum concentration (μg/m^3)	49.0	60.0	84.0
Number of days national standard exceeded (measured[1])	0	0	2

Where,

ppm = parts per million; μg/m3 = micrograms per cubic meter

1 Measured days are those days that an actual measurement was greater than the level of the state daily standard or the national daily standard. Measurements are typically collected every 6 days. Calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

Sources: ARB 2006c

Both ARB and EPA use this type of monitoring data to designate areas according to attainment status for criteria air pollutants established by the agencies. The purpose of these designations is to identify those areas with air quality problems and thereby initiate planning efforts for improvement. The three basic designation categories are nonattainment, attainment, and unclassified. Unclassified is used in an area that cannot be classified on the basis of available information as meeting or not meeting the standards. In addition, the California designations include a subcategory of the nonattainment designation, called nonattainment-transitional. The nonattainment-transitional designation is given to nonattainment areas that are progressing and nearing attainment. The most current attainment designations for the Tulare County portion of the SJVAB are shown in Table 1 for each criteria air pollutant.

Toxic Air Contaminants

Concentrations of TACs are also used as indicators of ambient-air-quality conditions. According to the *California Almanac of Emissions and Air Quality* (ARB 2006b), the majority of the estimated health risk from TACs can be attributed to relatively few compounds, the most important being PM from diesel-fueled engines (diesel PM). Diesel PM differs from other TACs in that it is not a single substance, but rather a complex mixture of hundreds of substances. Although diesel PM is emitted by diesel-fueled internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present. Unlike the other TACs, no ambient monitoring data are available for diesel PM because no routine measurement method currently exists. However, the ARB has made preliminary concentration estimates based on a PM exposure method. This method uses ARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results from several studies to estimate concentrations of diesel PM. In addition to diesel PM, benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, and perchloroethylene pose the greatest existing ambient risk, for which data are available, in California.

Diesel PM poses the greatest health risk among these ten TACs mentioned. Based on receptor modeling techniques, the ARB estimated the diesel PM health risk in 2000 to be 390 excess cancer cases per million people in the SJVAB. Since 1990, the diesel PM's health risk in the SJVAB has been reduced by 50%. Overall, levels of most TACs have gone down since 1990 except for para-dichlorobenzene and formaldehyde (ARB 2006b).

Odors

Typically odors are generally regarded as an annoyance rather than a health hazed. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor and in fact an odor that is offensive to one person may be perfectly acceptable to another (e.g., fast food restaurant). It is important to also note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

Quality and intensity are two properties present in any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as flowery or sweet, then the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word strong to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases. As this occurs, the odor intensity weakens and eventually becomes so low that the detection or recognition of the odor is quite difficult. At some point during dilution, the concentration of the odorant reaches a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

1.4 ENVIRONMENTAL EFFECTS AND MITIGATION

1.4.1 INTRODUCTION

This section describes the construction-related (short-term) and operation-related (long-term) air quality effects that are expected to occur under each alternative. The following discussion also includes a description of the methods and assumptions used to conduct the analysis and the criteria for determining the level of significance of the effects.

1.4.2 METHODOLOGY

CONSTRUCTION-RELATED EFFECTS

Criteria Air Pollutant and Precursor Emissions

Construction-related activities would result in project-generated criteria air pollutant (e.g., PM_{10}) and precursor emissions (e.g., ROG and NO_X) from motor vehicle travel (e.g., construction employee commute and meal trips), heavy-duty truck travel on proposed haul routes for material transport, and heavy-duty construction equipment at the proposed dam construction, staging, and borrow sites. Refer to Exhibit 1 for general locations of proposed haul routes, and dam construction, staging, and borrow sites.

Worst-case project-generated construction-related criteria air pollutant and precursor emissions were modeled in accordance with SJVAPCD-recommended methodologies (SJVAPCD 2002; Mitchell, pers. comm., 2006) using the EMFAC 2002 (ARB 2002) and Construction Emissions (SMAQMD 2006) models, and EPA air pollutant (AP)-42 emissions factors (EPA 1998 and 2003). Exact project-specific data (e.g., construction equipment types and number requirements, and maximum daily acreage disturbed) were not available at the time of this analysis. Thus, project-generated emissions of criteria air pollutant (e.g., PM_{10}) and precursor emissions (e.g., ROG and NO_X) were modeled based on best-available assumptions provided by the Corps, and default settings and parameters attributable to construction period (2008–2011) and site location. For instance, construction equipment would likely include scrapers, excavators, bulldozers, compactors, loaders, trucks, crushers, pumps, and other miscellaneous pieces of equipment (Rutherford and Davis, pers. comms., 2006). Refer to appendix for detailed modeling input data.

Tables 4 and 5 summarize the modeled project-generated construction-related criteria air pollutant and precursor emissions from motor vehicle travel (e.g., construction employee commute and meal trips), heavy-duty truck travel on proposed haul routes for material transport, and heavy-duty construction equipment at the proposed dam construction, staging, and borrow sites under Alternative 2 (New Earthen Embankment Alternative) and Alternative 3 (Jet Grout Alternative), respectively. Construction-related air quality effects were determined by comparing these modeling results with applicable SJVAPCD significance thresholds.

Table 4
Summary of Modeled Project-Generated Construction-Related Criteria Air Pollutant and Precursor Emissions Under the New Earthen Embankment Alternative

Phase and Duration	ROG	NO_X	PM_{10}
	Tons Per Year (TPY)		
Site Preparation (3–6 months)	0.7	3.6	3.3
Excavation (6 months)	1.0	8.6	931.5
Fill Placement (2.5 years)-(Without Borrow 8)	2.8	19.3	1,039.3
Fill Placement (2.5 years)-(With Borrow 8)	+1.7	+13.9	+49.1
Erosion Control/Road Base (3 months)	0.6	3.4	11.6
Worst-Case Annual Emissions (No Mitigation)	2.8	19.3	1,039.3
Worst-Case Annual Emissions (With Mitigation)[1]	2.7	15.2	259.8
SJVAPCD Significance Threshold	10	10	—

[1] Assumes a 5, 20, and 45% reduction in mobile-source exhaust emissions of ROG, NO_X, and PM_{10}, respectively, and a 75% reduction in fugitive PM_{10} dust emissions.

Refer to Appendix for detailed modeling input data and output results.

Source: Modeling performed by EDAW 2006.

Table 5
Summary of Modeled Project-Generated Construction-Related Criteria Air Pollutant and Precursor Emissions Under the Jet Grout Alternative

Phase and Duration	ROG	NO_X	PM_{10}
	Tons Per Year (TPY)		
Site Preparation (3–6 months)	0.7	3.6	3.3

Upstream Face and Downstream Slope (2.9 years)	8.5	38.1	167.0
Erosion Control/Road Base (3 months)	0.1	0.6	1.0
Worst-Case Annual Emissions (No Mitigation)	8.5	38.1	167.0
Worst-Case Annual Emissions (With Mitigation)[1]	7.6	30.4	56.5
SJVAPCD Significance Threshold	10	10	—

[1] Assumes a 5, 20, and 45% reduction in mobile-source exhaust emissions of ROG, NO_X, and PM_{10}, respectively, and a 75% reduction in fugitive PM_{10} dust emissions.

Refer to Appendix for detailed modeling input data and output results.

Source: Modeling performed by EDAW 2006.

Toxic Air Contaminant Emissions

Construction-related activities would also result in project-generated TAC emissions (e.g., diesel PM) from heavy-duty truck travel on proposed haul routes for material transport, and heavy-duty construction equipment at the proposed dam construction, staging, and borrow sites. As recommended by the SJVAPCD, a human health risk assessment (HRA) was performed to determine the exposure (i.e., cancer risk levels) of existing nearby sensitive-receptors (e.g., residences) from on-site diesel PM emission sources (Mitchell, pers. comm., 2006).

Refer to Exhibit 1 for general locations of existing nearby sensitive receptors, proposed haul routes, and dam construction, staging, and borrow sites.

As part of the HRA, air quality dispersion modeling was conducted using the EPA Industrial Source Complex Short Term 3 (ISCST3) model (Version 02035) with the ISC-AERMOD View interface (Version 5.3.1) (Lakes Environmental Software 2006) to determine the diesel PM concentrations from on-site trucks and equipment at existing nearby sensitive receptors. The air dispersion modeling was based on one year of hourly pre-processed meteorological data provided by SJVAPCD and terrain data from the U.S. Geological Survey (USGS 2006). Emission rates for heavy-duty trucks and equipment were based on factors and default parameters from the Construction Emissions Model (Version 5.2) (SMAQMD 2006). Exact project-specific data (e.g., construction equipment types and number requirements, and maximum daily acreage disturbed) were not available at the time of this analysis. Thus, project-generated emissions of diesel PM were modeled based on best-available assumptions provided by the Corps, and default settings and parameters attributable to the construction period (2008-2011) and site location. For instance, seasonal and hour-of-day emission rate variations were also incorporated to account for longer work days (i.e., two 10 hour shifts) during spring and summer and shorter work days during and fall and winter (Rutherford and Davis, pers. comms., 2006). Refer to appendix for detailed modeling input data.

These concentrations were used to conservatively estimate potential increases in cancer risk as a result of continuous exposure to existing nearby sensitive receptors. Cancer risk is expressed as excess cancer cases per one million exposed individuals. Cancer risk from exposure to diesel PM was calculated by multiplying the modeled annual average concentrations of diesel PM by a cancer risk factor of 0.00041453 and then adjusted for the length of the exposure period, as recommended by SJVAPCD (Reed, pers. comm., 2006).

In a similar manner, modeled concentrations of diesel PM, which also have non-carcinogenic (chronic) adverse health effects, were used to estimate resultant hazard indices (HIs). The level of chronic risk is based on a HI, determined by dividing the modeled annual average concentrations by the Reference Exposure Level (REL) for diesel PM. The REL is the concentration at or below which no adverse health effects are anticipated. OEHHA has recommended an ambient concentration of 5 micrograms per cubic meter (μg/m3) as the chronic inhalation REL for diesel PM (OEHHA 2006). Based on the dispersion modeling, the maximum average annual concentration of diesel PM would be 1.7 $\mu g/m^3$ at Receptor 50, which results in a chronic HI of 0.35. Because the maximum chronic HI is less than SJVAPCD's significance threshold of 1.0, there would be no noncancer chronic risk associated with the project.

Tables 6, 7, and 8 summarize the modeled excess cancer risk from motor vehicle travel (e.g., construction employee commute and meal trips), heavy-duty truck travel on proposed haul routes for material transport, and heavy-duty construction equipment at the proposed dam construction, staging, and borrow sites under Alternative 2 (New Earthen Embankment Alternative) and Alternative 3 (Jet Grout Alternative), respectively. Construction-related air quality effects were determined by comparing these modeling results with the applicable SJVAPCD significance thresholds.

Table 6
Summary of Modeled Project-Generated Construction-Related Excess Cancer Risk Under the New Earthen Embankment Alternative (No Mitigation)

Sensitive Receptor[1]	Excess Cancer Risk[2] (Chances per Million)			
	Without Borrow 8			With Borrow Area 8[3]
	Excavation of Existing Dam	Construction of New Dam	Total	
47*	74.1	70.0	**144.0**	0.1
48*	66.5	60.2	**126.8**	0.1
1*	49.6	50.8	**100.4**	0.1
1*	17.4	21.5	**38.9**	0.1
49*	51.4	46.8	**98.2**	0.1
50*	35.2	29.5	**64.7**	0.1
15*	17.8	19.7	**37.5**	0.1
2*	11.8	15.3	**27.1**	0.1
51[4]*	11.2	14.7	**25.9**	0.1
24*	4.3	20.7	**24.9**	0.4
3*	10.6	14.1	**24.7**	0.1
4*	4.5	6.4	**10.9**	0.1
16	3.4	5.0	8.4	0.1
17	3.0	4.3	7.3	0.1
23	2.8	3.4	6.2	0.1
19	2.5	3.6	6.1	0.1
18	2.2	3.5	5.7	0.1
20	2.3	3.2	5.4	0.1
26	1.9	2.4	4.4	0.1
25	1.5	2.7	4.2	0.1
21	1.8	2.4	4.2	0.1
46	0.6	3.5	4.1	0.4
22	1.2	1.5	2.7	0.1
27	0.9	1.2	2.1	0.1
28	0.8	1.2	2.0	0.1
45	0.3	0.9	1.2	0.2
8	0.3	0.8	1.2	2.7
43	0.3	0.9	1.1	0.2
44	0.3	0.9	1.1	0.2
5	0.3	0.8	1.1	5.0

Table 6
Summary of Modeled Project-Generated Construction-Related Excess Cancer Risk Under the New Earthen Embankment Alternative (No Mitigation)

Sensitive Receptor[1]	Excess Cancer Risk[2] (Chances per Million)			
	Without Borrow 8			With Borrow Area 8[3]
	Excavation of Existing Dam	Construction of New Dam	Total	
42	0.3	0.8	1.0	0.2
29	0.3	0.7	0.9	1.4
41	0.2	0.7	0.9	0.2
9	0.3	0.6	0.9	1.9
40	0.2	0.6	0.8	0.2
10	0.2	0.5	0.8	1.4
39	0.2	0.5	0.7	0.3
11	0.2	0.5	0.7	0.9
6	0.2	0.4	0.7	4.5
36	0.2	0.4	0.6	0.4
12	0.2	0.4	0.6	0.6
7	0.2	0.4	0.6	2.4
13	0.2	0.4	0.6	0.5
38	0.2	0.4	0.6	0.3
33	0.2	0.4	0.6	0.3
35	0.2	0.4	0.6	0.3
32	0.2	0.4	0.6	0.3
37	0.2	0.4	0.5	0.3
34	0.2	0.4	0.5	0.2
14	0.2	0.3	0.5	0.2
31	0.2	0.3	0.5	0.1
30	0.1	0.2	0.4	0.1
SJVAPCD Significance Threshold	—	—	10.0	—

[1] Refer to Exhibit 1 for sensitive receptor locations.
[2] Excess cancer risk levels were estimated using a cancer risk factor of 0.00041453 at residential receptors and a cancer risk factor or 0.00015716 at worker locations, as provided by SJVAPCD (Reed, pers. comm., 2006). In accordance with OEHHA guidance (OEHHA 2003), a short-term exposure duration was used for the 6-month excavation of the existing dam and an intermediate-term exposure was applied to the approximate 3 year construction of the earthen embankment dam (e.g., fill placement).
[3] Net change in total risk with Borrow 8.
[4] The values for receptor 51 are interpolations based on contours and the values at nearby receptors.
Refer to Appendix for detailed modeling input data and output results.
Source: Modeling performed by EDAW 2006.

Table 7
Summary of Modeled Project-Generated Construction-Related Excess Cancer Risk Under the New Earthen Embankment Alternative (With Mitigation)

Sensitive Receptor[1]	Excess Cancer Risk[2] (Chances per Million)			
	Without Borrow 8			With Borrow Area 8[3]
	Excavation of Existing Dam	Construction of New Dam	Total	
47*	53.6	48.0	**101.6**	0.1
48*	48.1	41.2	**89.3**	0.1
1*	36.0	35.0	**71.0**	0.1
1*	12.7	14.9	**27.6**	0.1
49*	37.2	32.1	**69.3**	0.1
50*	25.4	20.1	**45.5**	0.0
15*	13.0	13.7	**26.6**	0.1
2*	8.7	10.6	**19.3**	0.1
51[4]*	8.2	10.2	**18.5**	0.1
24*	3.2	14.8	**18.1**	0.1
3*	7.8	9.8	**17.6**	0.1
4	3.3	4.5	7.8	0.1
16	2.5	3.5	6.0	0.1
17	2.2	3.0	5.2	0.1
23	2.1	2.4	4.4	0.1
19	1.9	2.5	4.4	0.1
18	1.6	2.5	4.1	0.1
20	1.7	2.2	3.9	0.1
26	1.4	1.7	3.1	0.1
25	1.1	1.9	3.0	0.1
21	1.3	1.7	3.0	0.1
46	0.4	2.6	3.0	0.2
22	0.9	1.0	1.9	0.0
27	0.7	0.8	1.5	0.0
28	0.6	0.8	1.4	0.0
45	0.2	0.7	0.9	0.1
8	0.2	0.6	0.8	1.9
43	0.2	0.6	0.8	0.1
44	0.2	0.6	0.8	0.1
5	0.2	0.6	0.8	3.6
42	0.2	0.5	0.7	0.1
29	0.2	0.5	0.7	1.0
41	0.2	0.5	0.7	0.1
9	0.2	0.5	0.7	1.3
40	0.2	0.4	0.6	0.1
10	0.2	0.4	0.6	1.0

Table 7 Summary of Modeled Project-Generated Construction-Related Excess Cancer Risk Under the New Earthen Embankment Alternative (With Mitigation)				
Sensitive Receptor[1]	Excess Cancer Risk[2] (Chances per Million)			
	Without Borrow 8			With Borrow Area 8[3]
	Excavation of Existing Dam	Construction of New Dam	Total	
39	0.2	0.4	0.5	0.2
11	0.2	0.3	0.5	0.6
6	0.2	0.3	0.5	3.2
36	0.1	0.3	0.5	0.3
12	0.2	0.3	0.5	0.4
7	0.2	0.3	0.4	1.7
13	0.1	0.3	0.4	0.3
38	0.1	0.3	0.4	0.2
33	0.1	0.3	0.4	0.2
35	0.1	0.3	0.4	0.2
32	0.1	0.3	0.4	0.2
37	0.1	0.3	0.4	0.2
34	0.1	0.3	0.4	0.2
14	0.1	0.3	0.4	0.2
31	0.1	0.2	0.4	0.1
30	0.1	0.2	0.3	0.0
SJVAPCD Significance Threshold	—	—	10.0	—

[1] Refer to Exhibit 1 for sensitive receptor locations.

[2] Excess cancer risk levels were estimated using a cancer risk factor of 0.00041453 at residential receptors and a cancer risk factor or 0.00015716 at worker locations, as provided by SJVAPCD (Reed, pers. comm., 2006). In accordance with OEHHA guidance (OEHHA 2003), a short-term exposure duration was used for the 6-month excavation of the existing dam and an intermediate-term exposure was applied to the approximate 3 year construction of the earthen embankment dam (e.g., fill placement).

[3] Net change in total risk with Borrow 8.

[4] The values for receptor 51 are interpolations based on contours and the values at nearby receptors.

* Relocation would be required to reduce modeled excess cancer risk to less than the significance threshold.

Refer to Appendix for detailed modeling input data and output results.

Source: Modeling performed by EDAW 2006.

Table 8 Summary of Modeled Project-Generated Construction-Related Excess Cancer Risk Under the Jet Grout Alternative			
No Mitigation		With Mitigation	
Sensitive Receptor[1]	Excess Cancer Risk [2] (Chances per Million)	Sensitive Receptor[1]	Excess Cancer Risk [2] (Chances per Million)
47	145.6	**47**	104.4
48	130.1	**48**	93.3
49	99.9	**49**	71.9
1	96.0	**1**	68.8

Table 8 Summary of Modeled Project-Generated Construction-Related Excess Cancer Risk Under the Jet Grout Alternative			
No Mitigation		With Mitigation	
Sensitive Receptor[1]	Excess Cancer Risk [2] (Chances per Million)	Sensitive Receptor[1]	Excess Cancer Risk [2] (Chances per Million)
1	32.5	**1**	23.3
50	69.4	**50**	49.8
15	32.8	**15**	23.7
2	21.0	**2**	15.1
51[4]*	20.0	**51**	14.4
3	19.0	**3**	13.7
24	7.7	24	6.2
4	7.6	4	5.5
16	5.7	16	4.1
23	5.0	23	3.7
17	4.9	17	3.5
5	4.3	5	3.0
19	4.2	19	3.0
6	3.7	18	2.7
20	3.7	20	2.7
18	3.7	6	2.7
26	2.9	26	2.1
21	2.9	21	2.1
8	2.6	8	1.8
25	2.4	25	1.8
7	2.1	7	1.5
22	1.9	22	1.4
9	1.8	9	1.3
27	1.5	27	1.1
29	1.5	29	1.0
10	1.4	10	1.0
28	1.3	28	1.0
46	1.0	46	0.8
11	1.0	11	0.7
12	0.7	12	0.5
13	0.7	13	0.5
36	0.6	36	0.4
39	0.6	45	0.4
45	0.6	39	0.4
43	0.5	43	0.4
44	0.5	44	0.4

Table 8 **Summary of Modeled Project-Generated Construction-Related Excess Cancer Risk** **Under the Jet Grout Alternative**			
No Mitigation		With Mitigation	
Sensitive Receptor[1]	Excess Cancer Risk [2] (Chances per Million)	Sensitive Receptor[1]	Excess Cancer Risk [2] (Chances per Million)
42	0.5	42	0.4
33	0.5	33	0.4
32	0.5	32	0.4
41	0.5	41	0.4
35	0.5	35	0.3
38	0.5	38	0.3
40	0.5	40	0.3
37	0.4	37	0.3
14	0.4	14	0.3
34	0.4	34	0.3
31	0.4	31	0.3
30	0.2	30	0.2
SJVAPCD Significance Threshold	10.0	SJVAPCD Significance Threshold	10.0

1 Refer to Exhibit 1 for sensitive receptor locations.

2 Excess cancer risk levels were estimated using a cancer risk factor of 0.00041453, at residential receptors and a cancer risk factor or 0.00015716 at worker locations as provided by SJVAPCD (Reed, pers. comm., 2006). In accordance with OEHHA guidance (OEHHA 2003), a short-term exposure duration was used for the 6-month excavation of the existing dam and an intermediate-term exposure was applied to the approximate 3 year construction of the jet grout dam.

* Relocation would be required to reduce modeled excess cancer risk to less than the significance threshold.

Refer to Appendix for detailed modeling input data and output results.

Source: Modeling performed by EDAW 2006

OPERATION-RELATED EFFECTS

This analysis assumes that the operation of any of the project alternatives would not generate any new sources, because operation and maintenance of the alternatives would be unchanged compared with existing conditions. Following completion of the main dam construction, the office, vehicle maintenance, and other structures built to accommodate contractor and Corps personnel during project construction would be removed. The number of personnel serving onsite during construction would be reduced to the number currently serving to operate and maintain the facilities (Rutherford and Davis, pers. comms., 2006).

1.4.3 BASIS OF SIGNIFICANCE

Thresholds for determining the significance of air quality effects were based on the environmental checklist form in Appendix G of the California Environmental Quality Act Guidelines; and federal, state, and local guidance.

Air quality effects were considered significant if the project would result in:

- conflict with or obstruct implementation of the applicable air quality plan;
- violate any air quality standard or contribute substantially to an existing or projected air quality violation;

- expose sensitive receptors to substantial pollutant concentrations; or
- create objectionable odors affecting a substantial number or people.

None of the project alternatives would create objectionable odors affecting a substantial number of people. Thus, this issue is not discussed further in this analysis.

1.4.4 ALTERNATIVE 1: NO PROJECT

Under Alternative 1, Success Dam would not be modified. Because no construction activities would occur and the dam would continue to function as it currently functions, implementing Alternative 1 would have no effect on air quality. Therefore, no mitigation would be required. In addition, because no construction activities would occur under this alternative, implementing the No Project Alternative could not contribute toward a cumulative air quality effect. Therefore, it would not require mitigation.

1.4.5 ALTERNATIVE 2: NEW EARTHEN EMBANKMENT ALTERNATIVE

EFFECT 1: PROJECT-GENERATED CONSTRUCTION-RELATED CRITERIA AIR POLLUTANT AND PRECURSOR EMISSIONS

Construction-related activities under the New Earthen Embankment Alternative (Alternative 2) would result in a direct effect on air quality from project-generated criteria air pollutant (PM_{10}) and precursor emissions (ROG and NO_X) from heavy-duty truck travel on proposed haul routes; and from heavy-duty construction equipment at the proposed dam construction, staging, and borrow sites. Based on the modeling conducted (Table 4), worst-case project-generated construction-related NO_X emissions would exceed SJVAPCD's significance threshold of 10 tpy. In addition, because all control measures in compliance with the requirements of Regulation VIII are not currently incorporated into the project description, project-generated construction-related fugitive PM_{10} dust emissions (Table 4) would violate or contribute substantially to an existing or projected air quality violation, especially considering the current nonattainment status of Tulare County. Consequently, project-generated construction-related emissions could expose nearby existing sensitive receptors to substantial pollutant concentrations. As a result, this direct impact would be significant.

Optional Borrow Site

Construction-related activities under the New Earthen Embankment Alternative (Alternative 2) would result in a direct effect on air quality from project-generated criteria air pollutant (PM_{10}) and precursor emissions (ROG and NO_X) from heavy-duty truck travel on proposed haul routes; and from heavy-duty construction equipment at the proposed dam construction, staging, and borrow sites (including optional Borrow 8). Based on the modeling conducted (Table 4), worst-case project-generated construction-related NO_X emissions would exceed SJVAPCD's significance threshold of 10 tpy. In addition, because all control measures in compliance with the requirements of Regulation VIII are not currently incorporated into the project description, project-generated construction-related fugitive PM_{10}dust emissions (Table 4) would violate or contribute substantially to an existing or projected air quality violation, especially considering the current nonattainment status of Tulare County. Consequently, project-generated construction-related emissions could expose nearby existing sensitive receptors to substantial pollutant concentrations. As a result, this direct impact would be significant.

MITIGATION MEASURE 1: REDUCE FUGITIVE DUST EMISSIONS.

To reduce construction-related fugitive dust emission, the Corps shall implement the following measures. It is important to note that compliance with Regulation VIII is required by law and contains, but not limited to the following measures:

- Pre-water site sufficient to limit visible dust emissions (VDE) to 20% opacity.

- Phase work to reduce the amount of disturbed surface area at any one time.
- During active operations, apply water or chemical/organic stabilizers/suppressants sufficient to limit VDE to 20% opacity.
- During active operations, construct and maintain wind barriers sufficient to limit VDE to 20% opacity.
- During active operations, apply water or chemical/organic stabilizers/suppressants to unpaved haul/access roads and unpaved vehicle/equipment traffic areas sufficient to limit VDE to 20% opacity and meet the conditions of a stabilized unpaved road surface.
- An owner/operator shall limit the speed of vehicles traveling on uncontrolled unpaved access/haul roads within construction sites to a maximum of 15 miles per hour.
- An owner/operator shall post speed limit signs that meet State and Federal Department of Transportation standards at each construction site's uncontrolled unpaved access/haul road entrance. At a minimum, speed limit signs shall also be posted at least every 500 feet and shall be readable in both directions of travel along uncontrolled unpaved access/haul roads.
- When handling bulk materials, apply water or chemical/organic stabilizers/suppressants sufficient to limit VDE to 20% opacity.
- When handling bulk material, construct and maintain wind barriers sufficient to limit VDE to 20% opacity and with less than 50% porosity.
- When storing bulk materials, comply with the conditions for a stabilized surface as listed above.
- When storing bulk materials, cover bulk materials stored outdoors with tarps, plastic, or other suitable material and anchor in such a manner that prevents the cover from being removed by wind action.
- When storing bulk materials construct and maintain wind barriers sufficient to limit VDE to 20% opacity and with less than 50% porosity. If utilizing fences or wind barriers, apply water or chemical/organic stabilizers/suppressants to limit VDE to 20% opacity or utilize a 3-sided structure with a height at least equal to the height of the storage pile and with less than 50% porosity.
- Limit vehicular speed while traveling on the work site sufficient to limit VDE to 20% opacity.
- Load all haul trucks such that the freeboard is not less than 6 inches when material is transported across any paved public access road sufficient to limit VDE to 20% opacity.
- Apply water to the top of the load sufficient to limit VDE to 20% opacity.
- Cover haul trucks with a tarp or other suitable cover.
- Clean the interior of the cargo compartment or cover the cargo compartment before the empty truck leaves the site; and prevent spillage or loss of bulk material from holes or other openings in the cargo compartment's floor, sides, and/or tailgate; and load all haul trucks such that the freeboard is not less than 6 inches when material is transported on any paved public access road, and apply water to the top of the load sufficient to limit VDE to 20% opacity; or cover haul trucks with a tarp or other suitable cover.
- Owners/operators shall remove all visible carryout and trackout at the end of each workday.

- An owner/operator of any site with 150 or more vehicle trips per day, or 20 or more vehicle trips per day by vehicles with three or more axles shall take the actions for the prevention and mitigation of carryout and trackout.

- Within urban areas, an owner/operator shall prevent carryout and trackout, or immediately remove carryout and trackout when it extends 50 feet or more from the nearest unpaved surface exit point of a site.

- Within rural areas, construction projects 10 acres or more in size, an owner/operator shall prevent carryout and trackout, or immediately remove carryout and trackout when it extends 50 feet or more from the nearest unpaved surface exit point of a site.

- For sites with paved interior roads, an owner/operator shall prevent and mitigate carryout and trackout.

- Cleanup of carryout and trackout shall be accomplished by manually sweeping and picking-up; or operating a rotary brush or broom accompanied or preceded by sufficient wetting to limit VDE to 20% opacity; or operating a PM_{10}-efficient street sweeper that has a pick-up efficiency of at least 80%; or flushing with water, if curbs or gutters are not present and where the use of water would not result as a source of trackout material or result in adverse impacts on storm water drainage systems or violate any National Pollutant Discharge Elimination System permit program.

- An owner/operator shall submit a Dust Control Plan to the Air Pollution Control Officer (APCO) prior to the start of any construction activity on any site that will include 10 acres or more of disturbed surface area for residential developments, or 5 acres or more of disturbed surface area for non-residential development, or will include moving, depositing, or relocating more than 2,500 cubic yards per day of bulk materials on at least three days. Construction activities shall not commence until the APCO has approved or conditionally approved the Dust Control Plan. An owner/operator shall provide written notification to the APCO within 10 days prior to the commencement of earthmoving activities via fax or mail. The requirement to submit a dust control plan shall apply to all such activities conducted for residential and non-residential (e.g., commercial, industrial, or institutional) purposes or conducted by any governmental entity.

The following SJVAPCD-recommended enhanced and additional control measures shall be implemented to further reduce fugitive dust emissions.

- Install sandbags or other erosion control measures to prevent silt runoff to public roadways from adjacent project areas with a slope greater than 1%.

- Suspend excavation and grading activity when winds exceed 20 mph.

- Limit area subject to excavation, grading, and other construction activity at any one time.

MITIGATION MEASURE 2: REDUCE MOBILE-SOURCE EMISSIONS.

To reduce construction-related mobile-source exhaust emissions of ROG, NO_X, and PM_{10} the Corps shall implement the following measures.

- Exhaust emissions for construction equipment greater than 50 horsepower used or associated with the project shall be reduced by 20% of the total NO_X and by 45% of the total PM_{10} emissions from the statewide average as estimated by the ARB by using less polluting construction equipment, which can be achieved by utilizing add-on controls, cleaner fuels, or newer lower emitting equipment.

- Provide commercial electric power to the project site in adequate capacity to avoid or minimize the use of portable electric generators and the equipment.

- Where feasible, substitute electric-powered equipment for diesel engine driven equipment.
- When not in use, on-site equipment shall not be left idling.
- Limit the hours of operation of heavy duty equipment and/or the amount of equipment in use at any one time.
- Curtail construction during periods of high ambient pollutant concentrations (e.g., Spare the Air Days).
- Before construction contracts are issued, the project applicants shall perform a review of new technology, as it relates to heavy-duty equipment, to determine what (if any) advances in emissions reductions are available for use and are economically feasible. Construction contract and bid specifications shall require contractors to utilize the available and economically feasible technology on an established percentage of the equipment fleet. It is anticipated that in the near future both NO_X and PM_{10} control equipment will be available. The SJVAPCD shall be consulted with on this process.

Implementing Mitigation Measures 1 and 2 would result in a 5, 20, and 45% reduction in ROG, NO_X, and PM_{10} mobile-source exhaust emissions, respectively, and a 75% reduction in fugitive dust emissions. However, this mitigation would not be sufficient to reduce this air quality effect to less than significant. As a result, this direct impact would remain significant and unavoidable.

EFFECT 2: PROJECT-GENERATED CONSTRUCTION-RELATED TOXIC AIR CONTAMINANT EMISSIONS

Construction-related activities under the New Earthen Embankment Alternative (Alternative 2) would result in a direct effect on air quality from project-generated TAC emissions (i.e., diesel PM) from heavy-duty truck travel on proposed haul routes; and from heavy-duty construction equipment at the proposed dam construction, staging, and borrow sites. Based on the modeling conducted (Table 6), project-generated construction-related excess cancer risk would exceed SJVAPCD's significance threshold of 10 tpy at nearby existing sensitive receptors (Table 6). Consequently, project-generated construction-related emissions could expose nearby existing sensitive receptors to substantial pollutant concentrations. As a result, this direct impact would be significant.

Optional Borrow Site

Construction-related activities under the New Earthen Embankment Alternative (Alternative 2) would result in a direct effect on air quality from project-generated TAC emissions (i.e., diesel PM) from heavy-duty truck travel on proposed haul routes; and from heavy-duty construction equipment at the proposed dam construction, staging, and borrow sites (including optional Borrow 8). Based on the modeling conducted (Table 6), project-generated construction-related excess cancer risk would exceed SJVAPCD's significance threshold of 10 tpy at nearby existing sensitive receptors (Table 6). Consequently, project-generated construction-related emissions could expose nearby existing sensitive receptors to substantial pollutant concentrations. As a result, this direct impact would be significant.

MITIGATION MEASURE 3: REDUCE EXPOSURE OF SENSITIVE RECEPTORS TO DIESEL PARTICULATE MATTER

- All heavy-duty construction equipment shall be model year 2007 or newer.
- Sensitive receptors shall be relocated during construction of the project (Refer to Table 7) where modeled excess cancer risk exceeds 10 in one million.

Implementing Mitigation Measure 3 would reduce this direct impact to a less-than-significant level, as those sensitive receptors where the use of newer construction equipment would not reduce levels to less than the standards would be relocated.

Cumulative Effect Analysis

Under Alternative 2, construction-related activities would result in a direct effect on air quality from project-generated criteria air pollutant (PM_{10}) and precursor emissions (ROG and NO_X) from heavy-duty truck travel on proposed haul routes; and from heavy-duty construction equipment at the proposed dam construction, staging, and borrow sites. Based on the modeling conducted (Table 4), worst-case project-generated construction-related NO_X emissions would exceed SJVAPCD's significance threshold of 10 tpy. In addition, because all control measures in compliance with the requirements of Regulation VIII are not currently incorporated into the project description, project-generated construction-related fugitive PM_{10} dust emissions (Table 4) would violate or contribute substantially to an existing or projected air quality violation, especially considering the current nonattainment status of Tulare County and could expose nearby existing sensitive receptors to substantial pollutant concentrations. Mitigation has been identified to reduce the temporary significant construction-related air quality effects associated with Alternative 2, but the implementation thereof would not reduce the level of effect to less than significant. Consequently, project-generated construction-related emissions, when added to other closely related past, present, and reasonably foreseeable probable future projects could further violate or contribute substantially to an existing or projected air quality violation, especially considering the current nonattainment status of Tulare County and expose sensitive receptors to substantial pollutant concentrations. For these reasons, implementing Alternative 2 would result in a cumulatively considerable contribution to a significant air quality effect. As a result, this effect would be significant and unavoidable.

1.4.6 Alternative 3: Jet Grout Alternative

Effect 1: Project-Generated Construction-Related Criteria Air Pollutant and Precursor Emissions

As under Alternative 2, construction-related activities under the Jet Grout Alternative (Alternative 3) would result in a direct effect on air quality. Based on the modeling conducted (Table 5), worst-case project-generated construction-related NO_X emissions would exceed SJVAPCD's significance threshold of 10 tpy. In addition, because all control measures in compliance with the requirements of Regulation VIII are not currently incorporated into the project description, project-generated construction-related fugitive PM_{10} dust emissions (Table 5) would violate or contribute substantially to an existing or projected air quality violation, especially considering the current nonattainment status of Tulare County. Consequently, project-generated construction-related emissions could expose nearby existing sensitive receptors to substantial pollutant concentrations. As a result, this direct impact would be significant.

Mitigation Measure

Implement Mitigation Measures 1 (Reduce Fugitive Dust Emissions) and 2 (Reduce Mobile-Source Emissions), described above for Alternative 2. Implementing Mitigation Measures 1 and 2 would result in a 5, 20, and 45% reduction in ROG, NO_X, and PM_{10} mobile-source exhaust emissions, respectively, and a 75% reduction in fugitive dust emissions. However, this mitigation would not be sufficient to reduce this air quality effect to less than significant. As a result, this direct impact would remain significant and unavoidable.

Effect 2: Project-Generated Construction-Related Toxic Air Contaminant Emissions

As under Alternative 2, construction-related activities under Alternative 3 would result in a direct effect on air quality from project-generated TAC emissions (i.e., diesel PM) from heavy-duty truck travel on proposed haul routes; and from heavy-duty construction equipment at the proposed dam construction, staging, and borrow sites. Based on the modeling conducted (Table 8), project-generated construction-related excess cancer risk would exceed SJVAPCD's significance threshold of 10 tpy at nearby existing sensitive receptors (Table 8). Consequently, project-generated construction-related emissions could expose nearby existing sensitive receptors to substantial pollutant concentrations. As a result, this direct impact would be significant.

MITIGATION MEASURE

Implement Mitigation Measure 3 (Reduce Exposure of Sensitive Receptors to Diesel Particulate Matter), described above for Alternative 2. Implementing Mitigation Measure 3 would reduce this direct impact to a less-than-significant level.

CUMULATIVE EFFECT ANALYSIS

As under Alternative 2, Alternative 3 would contribute to a cumulative air quality effect. In addition, mitigation has been identified for the temporary significant construction-related air quality effects associated with Alternative 3, but the implementation thereof would not reduce the level of effect to less than significant. Consequently, project-generated construction-related emissions, when added to other closely related past, present, and reasonably foreseeable probable future projects could further violate or contribute substantially to an existing or projected air quality violation, especially considering the current nonattainment status of Tulare County and expose sensitive receptors to substantial pollutant concentrations. For these reasons, implementing Alternative 3 would result in a cumulatively considerable contribution to a significant air quality effect. As a result, this effect would be significant and unavoidable.

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